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EXAMINER	
SINGH, DALZID E	
ART UNIT	**PAPER NUMBER**
2613	

DATE MAILED: 04/11/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/817,629	ANTONIADES ET AL.	
	Examiner	Art Unit	
	Dalzid Singh	2613	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 January 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4,7-20,23 and 26-35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4,7-20,23 and 26-35* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 22 is objected to because of the following informalities: claim 22 is not listed on the listing of claims. Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 2, 10-13, 20, 26, 28 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Khaleghi et al (US Patent No. 6,040,933) in view of Chraplyvy et al (US Patent No. 5,225,922).

Regarding claims 1 and 20, as shown in Fig. 1, Khaleghi et al show channel equalization (i.e., optimizer) for transmission system between transmission terminal (12) and reception terminal (14) having at least two channel (for example, s1 – s4), the system comprising:

network monitor (18) or a processor which determines an adjustment for equalizing an optical signal to noise ratio (OSNR) (see col. 7, lines 49-67 to col. 8, lines 1-30, Khaleghi et al disclose method for equalizing each channel using predetermined equation for example, EQ. 2 in combination with EQ. 3 or the adjustment may be calculated using a predetermined reference channel; examiner takes official notice that

it would have been obvious the network monitor (18) comprises processor which receives and processes the optical signal); and,

a plurality of controllers, each controller associated with a transmitter in the transmission terminal, wherein each controller receives the reduced adjustment for an associated channel and provides the reduced adjustment to an associated transmitter (see col. 3, lines 29-31 and col. 8, lines 7-30, Khaleghi et al disclose that each transmitter has a control input for controlling optical power; therefore, based on this teaching, it is inherent that there exist a control unit on each transmitter in order to control optical power of the transmitter. Moreover, as shown in Fig. 1 and cited in col. 3, lines 27-29, since there are plurality of transmitters (Tx1 – Tx4) and each controller corresponds to each transmitter, therefore there must be plurality of controllers).

Khaleghi et al disclose that the equalizing system can be used to equalize channels at any location (see col. 5, lines 47-50) and differ from the claimed invention in that Khaleghi et al do not specifically disclose a telemetry link, which includes a processor, and which is disposed between the transmission terminal and the reception terminal. However, telemetry link provided between transmitter terminal and receiver terminal is well known. Chraplyvy et al is cited to show such well known concept. In Fig. 2, Chraplyvy et al show telemetry link (50), which include processor (56), provided between the transmitter terminal (18) and the receiver terminal (24). Therefore, it would have been obvious to an artisan of ordinary skill at the time the invention was made to provide such telemetry link as taught by Chraplyvy et al to the system of Khaleghi et al.

One of ordinary skill in the art would have been motivated to do such in order to monitor and maintain signal quality.

Furthermore, the combination of Khaleghi et al and Chraplyvy et al discloses equalizing signal to noise ratio by adjusting the optical channel and differs from the claimed invention in that the combination does not specifically disclose reducing the adjustment by one half of the OSNR equalization. On page 7, lines 24-28 of the specification, applicant discloses that "...optimization of the present invention is achieved by preemphasis using half the launched powers obtained from an OSNR equalization pre-emphasis algorithm, such as that noted in the techniques set forth above in the Background." The techniques set forth in the background are that of Khaleghi et al and Chraplyvy et al. as discussed above, the combination (see col. 7, lines 49-67 to col. 8, lines 1-30 of Khaleghi et al) clearly suggests that the power of the optical channels is adjustable. In col. 5, lines 21-56, Chraplyvy et al teach adjustment of SNR by adjusting optical power. In addition, the equation on page 9, line 10 of the specification describes relationship between OSNR and input power. This equation indicates that adjusting the input power changes OSNR value. Based on these teachings, it would have been obvious to an artisan at the time of the invention to adjust the optical channel such that the adjustment is reduced by one half of the OSNR equalization. Since OSNR value is related to power as described by mathematical equation, therefore discovery of an optimum value (such as half the OSNR) of a result effective variable in a known process is ordinarily within the skill of the art. *In re Antonie*, 559 F.2d 239, 618, 195 USPQ 6 (CCPA 1977); *In re Aller,* 42 CCPA 824, 220

F.2d 454, 105 USPQ 233 (1955). See also *In re Aller,* 105 USPQ 233 (CCPA 1955) and *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Regarding claim 2, Khaleghi et al teach that the equalization is determined in accordance with a profile of the quality of the signal (see col. 8, lines 7-12, Khaleghi et al disclose calculation of OSNR to obtain predetermine amount of the adjustment; OSNR is related to quality profile of the signal, such as noise, see col. 4, lines 11-19, therefore the predetermined amount is determined in accordance with a profile of the quality of the signal).

Regarding claims 10 and 26, Khaleghi et al teach that the processor (18) receives measured signals of the OSNR and determines the adjustment in accordance with the measured signals (see col. 7, lines 49-67 to col. 8, lines 1-30, Khaleghi et al disclose method for equalizing each channel using predetermined equation for example, EQ. 2 in combination with EQ. 3 or the adjustment may be calculated using a predetermined reference channel).

Regarding claims 11 and 28, Khaleghi et al teach that the processor calculates the OSNR in accordance with physical parameters of the transmission system (see col. 8, lines 7-30 , Khaleghi et al disclose calculation of OSNR to obtain predetermine amount of the adjustment; OSNR is related to quality profile of the signal, such as noise, produced by optical amplifier in the form of amplified spontaneous emission, see col. 4, lines 11-19, since optical amplifier is a physical component of the transmission system, therefore the predetermined amount is determined in accordance with physical parameters of the transmission system).

Regarding claims 12 and 13, Khaleghi et al disclose channel equalization (i.e., optimizer) for transmission system comprising controllers for controlling the transmitters (see claim 1 for discussion of the controller) and differ from these claims in that Khaleghi et al do not specifically disclose that the controller are provided at the output of the transmitter or integral with the transmitters. However, it would have been a matter of design choice to an artisan of ordinary skill in the art to provide control of the transmitter at the output of the transmitter or integral of the transmitter. This supporting rationale is based on a recognition that claimed differences exist not as a result of an attempt by applicant to solve problem, but merely amounts to selection of location known to an artisan of ordinary skill as design choice.

4. Claims 7-9 rejected under 35 U.S.C. 103(a) as being unpatentable over Khaleghi et al (US Patent No. 6,040,933) in view of Khoe et al (US Patent No. 4,942,568).

Regarding claim 7, Khaleghi et al disclose channel equalization (i.e., optimizer) for transmission system between transmission terminal (12) and reception terminal (14) having at least two channel (for example, s1 – s4) comprising a processor (18). Khaleghi et al differ from this claim in that Khaleghi et al do not specifically disclose a wavelength selective switch on at least one location in the transmission system, said wavelength selective switch allowing each channel to be processed by said processor. However, such wavelength selective switch is well known. Khoe et al is cited to show the use of wavelength selective switch for allow each channel to be processed by the processor (40) (see figure 2, Khoe et al show wavelength selective switch (10) allowing

each channel, (Σ1 to ΣN), coupled from coupler 13, to be processed by the processor (40)). Since information signal are transmitted in multiplexed fashion comprising of multiple wavelengths, due to noise and signal degradation, each wavelength of the multiplexed signal varies in signal strength (i.e., optical power). Therefore, there needs to be a system which measures signal quality of the multiplexed signal or signal quality of each wavelength signal. Since the wavelength selective switch of Khoe et al is well known, therefore it would have been obvious to an artisan of ordinary skill in the art to provide wavelength selective coupler of Khoe et al to the system of Khaleghi et al. One of ordinary skill in the art would have been motivated to do such in order to measure and monitor signal quality of each wavelength in order to equalize signal quality and provide a robust communication system.

Regarding claims 8 and 9, as discussed above, the combination of Khaleghi et al and Khoe et al teaches channel equalization (i.e., optimizer) for transmission system comprising wavelength selective coupler and differs from these claims in that the combination does not teach that the wavelength selective coupler can be located at plurality of locations or in the intermediate location of the transmission path. However, as the transmission line spans longer, it would have been obvious to provide the location of the wavelength selective switch at plurality of locations in the transmission path (including at the intermediate location) in order to obtain frequent measurements of the optical signal. As the transmission line spans longer, degradation of the signal quality increases, therefore, one of ordinary skill in the art would have been motivated to provide the wavelength switch coupler at plural location including the intermediate

location of the transmission span in order to minimize or eliminate noise within the optical signal.

5. Claims 4, 14-19, 29 and 30-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Khaleghi et al (US Patent No. 6,040,933) in view of Chraplyvy et al (US Patent No. 5,225,922) and further in view of Chraplyvy et al (US Patent No. 5,847,862).

Regarding claims 14 and 29, as shown in Fig. 1, Khaleghi et al show channel equalization (i.e., optimizer) for transmission system between transmission terminal (12) and reception terminal (14) having at least two channel (for example, s1 – s4), the system comprising:

network monitor (18) or a processor which determines an adjustment for equalizing an optical signal to noise ratio (OSNR) (see col. 7, lines 49-67 to col. 8, lines 1-30, Khaleghi et al disclose method for equalizing each channel using predetermined equation for example, EQ. 2 in combination with EQ. 3 or the adjustment may be calculated using a predetermined reference channel; examiner takes official notice that it would have been obvious the network monitor (18) comprises processor which receives and processes the optical signal); and,

a plurality of controllers, each controller associated with a transmitter in the transmission terminal, wherein each controller receives the reduced adjustment for an associated channel and provides the reduced adjustment to an associated transmitter (see col. 3, lines 29-31 and col. 8, lines 7-30, Khaleghi et al disclose that each

transmitter has a control input for controlling optical power; therefore, based on this teaching, it is inherent that there exist a control unit on each transmitter in order to control optical power of the transmitter. Moreover, as shown in Fig. 1 and cited in col. 3, lines 27-29, since there are plurality of transmitters (Tx1 – Tx4) and each controller corresponds to each transmitter, therefore there must be plurality of controllers).

Khaleghi et al disclose that the equalizing system can be used to equalize channels at any location (see col. 5, lines 47-50) and differ from the claimed invention in that Khaleghi et al do not specifically disclose a telemetry link, which includes a processor, and which is disposed between the transmission terminal and the reception terminal. However, telemetry link provided between transmitter terminal and receiver terminal is well known. Chraplyvy et al is cited to show such well known concept. In Fig. 2, Chraplyvy et al show telemetry link (50), which include processor (56), provided between the transmitter terminal (18) and the receiver terminal (24). Therefore, it would have been obvious to an artisan of ordinary skill at the time the invention was made to provide such telemetry link as taught by Chraplyvy et al to the system of Khaleghi et al. One of ordinary skill in the art would have been motivated to do such in order to monitor and maintain signal quality.

Furthermore, the combination of Khaleghi et al and Chraplyvy discloses channel equalization (i.e., optimizer) for transmission system comprising a processor for determining adjustment of optical power as discussed above and differ from these claims in that the combination does not specifically disclose that the adjustment is in accordance with fiber non-linearities of the system. However, it is well known in the

optical communication that non-linearities of the transmission system is the function of optical power. As the optical power increases, non-linearities of the system increases. Chraplyvy et al is cited to show such well known correlation (see col. 3, lines 2-9). Since fiber-nonlinearity is related to optical power, therefore it would have been obvious to an artisan of ordinary skill in the art to adjust optical power of the transmission system as discussed by the combination in order to minimize fiber non-linearities of the transmission system. One of ordinary skill in the art would have been motivated to do this in order to increase signal to noise ratio of the system which will allow greater transmission capacity.

Regarding claims 4, 15, 17, 30 and 32, Khaleghi et al disclose channel equalization (i.e., optimizer) for transmission system comprising a processor for determining adjustment of optical power in accordance with a relative influence of noise as discussed above and differ from these claims in that Khaleghi et al do not specifically disclose that the adjustment is in accordance with fiber non-linearities of the system. However, it is well known in the optical communication that non-linearities of the transmission system is the function of optical power. As the optical power increases, non-linearities of the system increases. Chraplyvy et al is cited to show such well known correlation (see col. 3, lines 2-9). Since fiber-nonlinearity is related to optical power, therefore it would have been obvious to an artisan of ordinary skill in the art to adjust optical power of the transmission system as discussed by the combination in order to minimize fiber non-linearities of the transmission system. One of ordinary skill

in the art would have been motivated to do this in order to increase signal to noise ratio of the system which will allow greater transmission capacity.

Regarding claims 16 and 31, Khaleghi et al teach that the predetermined amount is determined in accordance with a profile of the quality of the signal (see col. 8, lines 7-12, Khaleghi et al disclose calculation of OSNR to obtain predetermine amount of the adjustment; OSNR is related to quality profile of the signal, such as noise, see col. 4, lines 11-19, therefore the predetermined amount is determined in accordance with a profile of the quality of the signal).

Regarding claim 18 and 33, Khaleghi et al teach that the processor (18) receives measured signals of the predetermined characteristic and determines the adjustment in accordance with the measured signals (see col. 7, lines 49-67 to col. 8, lines 1-30, Khaleghi et al disclose method for equalizing each channel using predetermined equation for example, EQ. 2 in combination with EQ. 3 or the adjustment may be calculated using a predetermined reference channel).

Regarding claims 19 and 35, Khaleghi et al teach that the processor calculates the predetermined characteristic in accordance with physical parameters of the transmission system (see col. 8, lines 7-30 , Khaleghi et al disclose calculation of OSNR to obtain predetermine amount of the adjustment; OSNR is related to quality profile of the signal, such as noise, produced by optical amplifier in the form of amplified spontaneous emission, see col. 4, lines 11-19, since optical amplifier is a physical component of the transmission system, therefore the predetermined amount is determined in accordance with physical parameters of the transmission system).

Regarding claim 34, as shown in Fig. 4 and cited in col. 7, lines 32-54, Khaleghi et al show that receiving of the optical signal is from at least one of the reception terminal (Rx5 or Rx6) and a non-terminal point in the transmission system (Khaleghi et al show that receiving of the optical signal is from the reception terminal shown as Rx 5 or Rx6).

Response to Arguments

6. Applicant's arguments filed 27 January 2006 have been fully considered but they are not persuasive.

Applicant argues that the reference Khaleghi et al lack the disclosure of a processor which determines an adjustment for equalizing an optical signal to noise ratio (OSNR) for each channel and reduces the adjustment by one half of the OSN equalization. On page 7, lines 24-28of the specification, applicant discloses that "...optimization of the present invention is achieved by preemphasis using half the launched powers obtained from an OSNR equalization pre-emphasis algorithm, such as that noted in the techniques set forth above in the Background." The techniques set forth in the background are that of Khaleghi et al and Chraplyvy et al; as discussed above, the combination (see col. 7, lines 49-67 to col. 8, lines 1-30 of Khaleghi et al) clearly suggest that the power of the optical channels are adjustable. In col. 5, lines 21-56, Chraplyvy et al teach adjustment of SNR by adjusting optical power. In addition, the equation on page 9, line 10 of the specification describes relationship between OSNR and input power. This equation indicates that adjusting the input power changes OSNR

value. Based on these teachings, it would have been obvious to an artisan at the time of the invention to adjust the optical channel such that the adjustment is reduced by one half of the OSNR equalization. Furthermore, the network monitor ((18) shown in Fig. 1) of Khaleghi et al receives and processes the optical signal, therefore it would have been obvious that there exist processor within the network monitor. In addition, the secondary reference to Chraplyvy et al discloses controller which comprises microprocessor (see col. 4, lines 26-32).

7. Applicant's arguments with respect to claim 14 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dalzid Singh whose telephone number is (571) 272-3029. The examiner can normally be reached on Mon-Fri 9am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571) 272--3022. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DS
April 6, 2006
Dalrid Singh